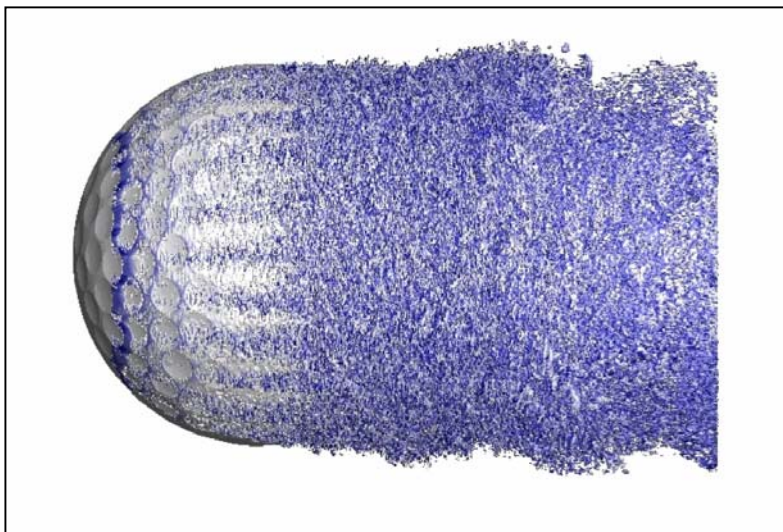


Super detailed analysis for air flows around a golf ball

SRI Sports Ltd. (HQ: Kobe Japan, President: Hiroyuki Bamba) have developed DNS (Direct Numerical Simulation) Technology for golf balls to do more detailed analysis of air flows around a golf ball in flight with greater detail and precision than has ever been accomplished before. This exciting achievement comes from joint research with Arizona State University, University of Maryland and Sumitomo Rubber Industries Ltd. This technology is applied for the development of golf balls flying farther from now on.



The Golf Ball DNS Technology output this image (an example).

It shows that numerous small vortices are generated around a golf ball.

(The non-spinning golf ball flies with 40m/s speed.)

This DNS Technology for golf balls was developed for detailed study of how the golf ball experiences aerodynamic forces, the drag force generated from the surrounding air flow which pushes against the direction of motion of the golf ball, and how dimples should be designed to reduce drag.

In order to calculate air flows at high speeds around a body that has a small patterned indented surface, like a golf ball, it is necessary to divide the region around the ball into about 1 billion parts for CFD (Computational Fluid Dynamics) simulations. Such CFD simulation was very difficult because of the huge amount of computational resource and effort involved. Therefore, with previous technology it was common to use approximations of the flow equation and reduce the number of divided parts to several ten million and then simulate with less precision. This previous technology could not simulate turbulent flows generated by individual dimples in detail, and could not provide enough information to design the dimples.

Thus, we started to develop simulation method, DNS, which numerically solves the

Navier-Stokes equations that define air flows, in a joint research with Arizona State University, University of Maryland and Sumitomo Rubber Industries Ltd. We have developed several technologies, which are a treatment of the change of boundary condition due to rotation of a ball and parallelization for using a large number of CPUs. Applying those technologies, we could extend the DNS technology for a golf ball.

This DNS technology reveals of the intricate details of the flow, such as small vortices that are generated around a golf ball and thus reveal turbulent flows generated by individual dimples. Related to a spinning golf ball, we had a success for 5m/s ball speed. With ongoing high speed and spinning simulations, the obtained detailed information will make it possible to design dimples, which enable a ball flying farther.



Image of calculated result by previous technology.

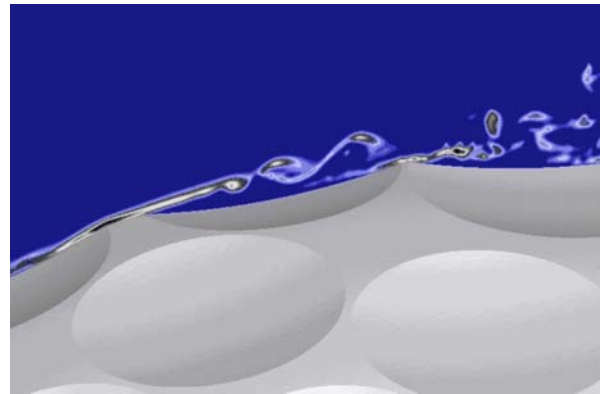


Image of calculated result by DNS technology.